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XVII.—*On the Chiroptera of Nepal.*—By J. SCULLY.

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The local distribution of our Indian Mammalian fauna is not only of special interest to naturalists in this country, but is also important to those who are mainly concerned with questions of general geographical distribution. To be of real use, local lists should be founded on specimens actually captured in the region under review; less direct evidence should rarely be accepted. And nowhere, perhaps, in this great country is greater precision required in assigning a station to the forms which inhabit it than in the case of the Himalayas. For not only does the fauna of these mountains differ markedly according to the elevation above sea-level, but it also varies strikingly as we proceed from east to west in them. We have, moreover, in the Himalayas a meeting ground of Palæartic, Indian, and Malay forms; and, for the elucidation of the complex questions of station and habitat of species, strict accuracy is required in lists of forms inhabiting merely political divisions of the Himalayas.

In view of the considerations above mentioned, the expression so often affixed to a species of "Habitat, Nepal" might be only a degree less vague than "Habitat, Himalayas," were it not for what may be called an accident. The term "Nepal" may mean either the whole State of Nepal, or a very small part of it, the Nepal Valley. The State of Nepal is about 500 miles in length, and has an average breadth of about 100 miles; part of this country differs in no way from the

adjoining plains of India, but most of it is highly mountainous, and in it, indeed, is found the highest mountain in the world. The Nepal Valley, the true "Nepal" of the natives, is a small tract, some 20 miles in length by 15 in breadth, at an elevation of from 4050 to 4500 feet above sea-level, in which is situated the capital of the state, Kathmandu. But the Nepal Valley is the only part of the state which has been efficiently explored zoologically, and, consequently, we may be pretty certain that, when the term Nepal only is used to denote the station of a species, the Nepal Valley is what is really meant.

I once lived for two years in the Nepal Valley, and while there made large collections of zoological specimens. Amongst these, I preserved 40 specimens of bats, and, on my return to England, I spent some time on a careful identification of them, by reference to published descriptions and by comparison with specimens in the British Museum. In this way, I ascertained that the whole of my specimens were referable to only 10 species, and the next step was to find out whether the forms I had secured were previously known to occur in Nepal. This task proved much more difficult than the mere identification of the species; the information available about the species of Chiroptera actually inhabiting Nepal being somewhat vague and confused.

In order to show why the matter lacks precision, it is necessary to trace the source of our information on the subject.

Mr. Brian H. Hodgson, to whose labours zoological science is so largely indebted, lived for more than twenty years in the Nepal Valley; and during this time he made very extensive zoological collections, and described many new forms. He discriminated altogether *twelve* species of bats from Nepal, and to every one of these he gave a new scientific name. Unfortunately, however, he did not describe all the species whose names he published, and some of the descriptions he gave were not sufficiently full to fix the species intended without doubt. Mr. Hodgson presented most of his specimens from Nepal to the British Museum, and he also gave a few to the Asiatic Society of Bengal. This led to Dr. J. E. Gray and Mr. Ed. Blyth identifying some of Hodgson's species with others previously named by different authors, and in some cases to more extended description of the Nepalese specimens. Some doubt and error were in this way introduced, as will be explained further on; the doubt hanging over the species named by Mr. Hodgson but never described by him.

Mr. Hodgson left Nepal in 1844. He never returned to that country, but, after a visit to England, he settled for some years at Darjiling, in the Sikkim Himalayas east of Nepal, and collected zoological specimens there largely. These spoils he also gave to the British

Museum and to the museum of the East India Company in London. Mr. Hodgson's name had, however, become so firmly connected with Nepal in the minds of English zoologists, that some portion of his collections in Sikkim were wrongly assigned by them to Nepal. So that, mainly by Dr. Horsfield, Hodgson's additions of Chiroptera from Darjiling were published as coming from the former country. Owing to this confusion, at least half a dozen species of bats from Sikkim, never obtained by Hodgson in Nepal, were credited to the latter country on the strength of that naturalist having collected them.

In 1876 and 1878, Dr. Dobson's two admirable works on the Chiroptera appeared. The task this author had on hand was too extensive to permit his paying particular attention to a relatively small question like the station of certain species in Nepal; he had, moreover, to be guided to some extent by previous writers, and to rely on museum labels, which are not always accurate. He has in consequence given in his works some species as from Nepal which were not obtained there by Hodgson or any one else, and has altogether omitted mention in his synonymy of two names given by Hodgson to Nepalese species.

In short, without much balancing of evidence, it was impossible to draw up a correct list of the bats of Nepal from the writings of the authors I have referred to; and I consequently determined to investigate the whole question with the aid of the specimens I had myself collected. The result of my enquiry is set forth in this paper.

I have already mentioned Mr. Hodgson's collection of bats from Nepal. This forms the foundation of our knowledge on the subject, and the subsequent additions of material can be readily indicated. In 1871, a collector of the Indian Museum obtained 3 specimens of bats, representing two species, at Kathmandu; and the third and last collection of Nepalese Chiroptera is my own.

Mr. Hodgson named 12 species from Nepal, but some of his specimens in the British Museum show that he really obtained 13 species in that country. The collector of the Indian Museum did not, I think, add anything to Hodgson's list, although one of his specimens was described as a new species by Dr. Dobson (see p. 253). Of the 10 species which I obtained, no less than 5 were never secured by Mr. Hodgson in Nepal. The inference I draw from this is that the list of species of Chiroptera now actually known to occur in the Nepal Valley does not completely represent the forms to be found there. A considerably extended list must be the reward of future workers in that country.

As regards a list of bats inhabiting the whole State of Nepal, that would certainly include a very large number of species not to be found in the Nepal Valley; for anything I know to the contrary nearly every



species of bat found in India *may* occur in Nepal territory. That must be mere matter of conjecture, for, as I have mentioned, we have only certain knowledge of the majority of forms which occur in and near the Nepal Valley.

In the following list reference is made under every species to the ample descriptions given in Dr. Dobson's works. Detailed descriptions would therefore be quite superfluous in this paper; but I have endeavoured to include such information as is available, from Indian sources, regarding the habits of the animals. It is matter for regret that our knowledge of the habits of bats is so scant.

#### I. PTEROPUS MEDIUS.

*Pteropus medius*, Temminck, Monogr. Mammal. i, p. 176 (1827); Dobson, Monogr. Asiat. Chiroptera, p. 18 (1876); Cat. Chir. Brit. Mus. p. 51 (1878).

*Pteropus leucocephalus*, Hodgson, J. A. S. B. vol. iv, p. 700 (1835).

Mr. Hodgson appears to have obtained a number of specimens of this bat in Nepal, as he presented four examples collected there to the British Museum. The type of *Pteropus leucocephalus* measured, length of head and body 10 inches, and expanse 46; the weight of the animal was 22 ounces. Dr. Dobson mentions that all these Nepalese examples have the head and under surface paler than usual, and that one specimen has an abnormal additional upper molar, immediately behind the third molar.

Mr. Hodgson informs us that this species never appears in the central region of Nepal save in autumn, when it comes in large bodies to plunder the ripe fruit in gardens. So far as the Nepal Valley is concerned, this remark hardly accords with my two years' experience of that portion of the country; for I was never able to obtain a specimen of *Pteropus medius* there. Of late years, at all events, this animal can only be regarded as a straggler to the Nepal Valley, and, whenever it does make its appearance there, I have little doubt that it merely travels about a dozen miles from the low and hot valley of the Trisul Ganga, immediately to the north-west of Nepal. Its route to a point so far in the interior of the Nepal mountains would naturally be along the easy gradient offered by the valley of the Gandak river, and its eastern-branch up to Nowakot (or Nayakot).

An interesting note will be found in Dr. J. Anderson's 'Catalogue of the Mammalia in the Indian Museum' (1881, p. 101) on some semi-migratory movements of *Pteropus medius*, in immense numbers, during autumn.



## 2. CYNONYCTERIS AMPLEXICAUDATA.

*Pteropus amplexicaudatus*, Geoffroy, Ann. du Mus. xv, p. 96 (1810).

*Pteropus pyrivorus*, Hodgson, Journ. Asiat. Soc. Beng. vol. iv, p. 700 (1835).

*Cynonycteris amplexicaudata*, Dobson, Mon. Asiat. Chir. p. 29 (1876) ; Cat. Chir. Brit. Mus. p. 72 (1878).

Mr. Hodgson's description of his *Pteropus pyrivorus* from Nepal leaves little doubt that he was referring to *Cynonycteris amplexicaudata* : he gives, length of head and body 6 inches, tail 0·5, expanse 24 ; weight 5 ounces. And Dr. Dobson's examination of the type specimen in the British Museum settles the question. Mr. Hodgson says that these bats only appear in Central Nepal in autumn, and at midnight, when they come in large bodies to plunder the fruit-gardens. As the animal was considered a perfect pest from the havoc it made among the ripe pears, he called it *pyrivorus*. He adds that when these bats appear in Central Nepal they must necessarily come from a very considerable distance, and that in the plains it is noted of them that they will travel 30 or 40 miles, and as many back, in a single night, in order to procure food.

These remarks of Mr. Hodgson as to the habits of *Pteropus pyrivorus* have been repeatedly misapplied to a totally distinct species of bat. Dr. J. E. Gray wrongly placed *Pt. pyrivorus* as a synonym of *Cynopterus marginatus* in his List of 'Mammalia in the British Museum' published in 1843. In 1844, Blyth confidently asserted that *Pteropus pyrivorus* was the same as *Cynopterus marginatus* (J. A. S. B. XIII, p. 479) ; it does not appear that he had seen an example named by Hodgson, but Gray certainly had two Nepalese specimens before him which are still in the collection of the British Museum. Horsfield, Hodgson himself, Hutton, and Dobson followed suit in this wrong determination. Hutton (P. Z. S. 1872, p. 693), under the head of *C. marginatus*, quotes Hodgson's account of *Pt. pyrivorus* and makes some remarks about the (supposed) wonderful feat accomplished by this bat in travelling from the plains to the Nepal Valley, and back again, in a single night. Dr. Dobson gives *Pt. pyrivorus* as a synonym, and quotes a portion of Hutton's remarks, in his article on *Cynopterus marginatus* in the Monograph of Asiatic Chiroptera (p. 26). But in the 'Catalogue of Chiroptera in the British Museum,' published two years later, he finds that *Pteropus pyrivorus* is undoubtedly *Cyn. amplexicaudata*, and gives Mr. Hodgson's remarks about its habits, correctly, under the description of the latter animal. The proverbial immortality of error, however, asserts itself, for, in the work last mentioned, we find the article on *Cynopterus marginatus* transcribed from the Monograph without excision of the references to *Pteropus pyrivorus*. The latter title is given as a synonym with a re-

ference to P. Z. S. 1836, p. 36; and, at page 83, Capt. Hutton's misapplied remarks about *C. marginatus* being a perfect pest in Nepal &c. is repeated. It is easy to show that both these entries are erroneous. There is no mention of any bat on page 36 of the Proceedings of the Zoological Society for 1836; the page should be 46, and there will be found the name only of *Pteropus pyrivorus*, whose characters have to be sought for in the 'Journal of the Asiatic Society of Bengal,' that is to say, in Hodgson's original description in Vol. IV, 1835. Moreover, Dr. Dobson does not find any specimen of *Cynopterus marginatus* from Nepal in the British or Indian Museums, Mr. Hodgson never having obtained any example of it in that country. As to Captain Hutton's remarks on the habits of (so-called) *Cynopterus marginatus* in Nepal, that writer of course knew nothing of the bats of Nepal beyond what he derived from Hodgson's published accounts, and he merely followed Blyth and others in supposing that *Pt. pyrivorus* was a synonym of *C. marginatus*.

About the great distances supposed to be traversed by *C. amplexicaudata* in a single night in search of food, I think there is a misconception—at least so far as relates to the Nepal Valley. At the time Mr. Hodgson wrote his account of this species, he was probably not familiar with the Nowakot (or Nayakote) district, about 16 miles only in a direct line from Kathmandu. This part of the country, although situated to the north-west of the Nepal Valley, is more than 2000 feet lower than the latter; one part of it, at Devighat, being less than 2000 feet above sea-level. The climate, vegetation, and fauna of this district naturally differ strikingly from those of the Nepal Valley, and here certainly we may expect to find both *Pteropus medius* and *Cynon. amplexicaudata* quite at home. A glance at any recent large scale map of India will show the broad valley of the Gandak river stretching from the plains into the Nepal hills, and Nowakot in the valley of the Trisul Ganga, the eastern affluent of the Gandak. Although so far in the interior of the hills, it will readily be understood that, in such hot malarious valleys, we have a direct continuation of the climate and flora suited to *C. amplexicaudata*. It is no wonder then that this bat should stray from the Nowakot district into the Nepal Valley in search of food, at suitable seasons; and the supposition of its travelling 40 miles in a direct line over hill and dale, to visit the Nepal Valley at midnight, may be dismissed as improbable.

Three examples of this species, from Nepal, were presented by Mr. Hodgson to the British Museum, and these were probably the only specimens he obtained in that country.

## 3. CYNOPTERUS MARGINATUS.

*Pteropus marginatus*, Geoffroy, Ann. du Mus. xv, p. 97 (1810).

*Cynopterus marginatus*, Dobson, Mon. Asiat. Chir. p. 24 (1876); Cat. Chir. Brit. Mus. p. 81 (1878).

I obtained only two specimens of this species in Nepal, one from the Nowakot district about 16 miles north-west of Kathmandu; and another just within the Nepal Valley, which had evidently strayed there from the Nowakot district. The captures were effected on the 13th and 27th of July. The first example obtained is a female, evidently an old animal, as the molars are much worn, and the second is a male, apparently full grown, but not old.

The following are measurements taken from these specimens after preservation in alcohol:—

	♀	♂
Length, head and body .....	3·6	3·2
"    tail .....	0·45	0·45
"    head .....	1·3	1·25
"    ear (anteriorly from notch) ... ..	0·7	0·7
Breadth, ear .....	0·47	0·45
Length, ear to tip of nostril ... ..	1·1	1·1
"    eye to tip of nostril .....	0·5	0·47
"    forearm.....	2·5	2·43
"    thumb and claw.....	0·9	1·03
"    third finger.....	4·1	3·95
"    fifth finger... ..	3·1	2·9
"    tibia.....	0·95	0·86
"    foot and claws.....	0·6	0·55
Expanse.....	16·0	16·0

The dental formula of these two specimens is:—

Incisors  $\frac{4}{4}$ , canines  $\frac{2}{2}$ , premolars  $\frac{4}{4}$ , molars  $\frac{4}{4}$  = 30.

Ears margined with white; wing-membrane from basal half of first toe; fur olive-brown above, pale fulvous beneath. Claws black, with white tips. Compared with specimens of *C. marginatus* in the British Museum, I could not detect any difference except in size, the Nepalese examples being decidedly small and having short ears. My measurements accord best with those of *C. brachyotus*, from S. Andaman Island, given by Dobson in the Monograph of Asiatic Chiroptera; but, as this variety does not even figure as a synonym in the Catalogue of Chiroptera published by him later, it is to be presumed that *C. marginatus* must be regarded as a species which varies greatly in all dimensions.

Mr. Hodgson did not obtain this species in Nepal, and, although it has often been quoted as from that country on his authority, it has been



shown, under the head of *Cynonycteris amplexicaudata*, that this was founded on error. Consequently, the present notice is the first authentic record of the occurrence of *C. marginatus* in Nepal.

#### 4. RHINOLOPHUS LUCTUS.

*Rhinolophus luctus*, Temminck, Monogr. Mammal. ii, p. 24 (1835); Hutton, Proc. Zool. Soc. Lond. 1872, p. 694; Dobson, Mon. Asiat. Chir. p. 39 (1876); Cat. Chir. Brit. Mus. p. 105 (1878).

*Rhinolophus perniger*, Hodgson, Journ. As. Soc. Beng. vol. xii, pt. i, p. 414 (1843.)

There seems to be no doubt now that the species described by Hodgson, from Nepal, under the name of *Rhinolophus perniger* is, as Blyth first stated, the same as *Rh. luctus*, Temminck. Mr. Hodgson gives the following measurements of the type of *Rh. perniger*, a female: length of head and body 3·25 inches, tail 1·12, head 1·31, expanse 17, ear from antea base 1·68, ear from crown of head or postea base 1·37, radius 2·62, third finger 4·0, tibia 1·37, foot 0·81. Captain Hutton gives, for *Rh. luctus* from Masuri, head and body 3·5 to 4·6 inches, tail 1·95 to 2·12, ear 1·5, expanse 17·12 to 18·5, radius 2·75 to 3, third finger 4·5.

Mr. Hodgson did not present any example of *Rh. perniger* to the British Museum, but he gave a skeleton of the species to the Asiatic Society in 1842, which is at present in the collection of the Indian Museum. Dr. Dobson enters this example in the catalogue appended to his 'Monograph of Asiatic Chiroptera' (p. 194), and under the heading of locality he puts "Nipal?" There can, however, be no doubt that this specimen having been received from Mr. Hodgson in 1842 must have come from Nepal and no other country. I have not been able to trace any other authentic record of a Nepalese specimen of the species.

Concerning the habits of this bat in Nepal, Mr. Hodgson says that it is shy and never approaches houses or cultivated country; and that it dwells in the deep forests and caves of the more precipitous mountains. On this Captain Hutton remarks that such are not the habits of *Rh. luctus* at higher elevations in the Himalayas further west than Nepal. I am disposed to think that Hodgson's observation is correct, so far as Nepal is concerned. I never obtained a specimen in the valley during my residence there, and, if it had anything like the habits of *Rh. minor* or of the different species of *Phyllorhina* in Nepal, I could not have failed to secure such a fine and conspicuous species as *Rh. luctus*.

As Mr. Hodgson obtained very few specimens of it in Nepal (perhaps only one), and judging from my own want of success, I believe

this species to be rare in that locality. It probably affects higher elevations than the Nepal Valley. Captain Hutton has given a very interesting account of the habits of *Rh. luctus*; this has been quoted in Dr. Dobson's Monograph and, being therefore readily accessible, need not be reproduced here.

### 5. RHINOLOPHUS MACROTIS.

*Rhinolophus macrotis*, Hodgson, Blyth, Journ. As. Soc. Beng. vol. xiii, pt. i, p. 485 (1844); Hutton, Proc. Zool. Soc. Lond. 1872, p. 699; Dobson, Mon. As. Chir. p. 45 (1876), Cat. Chir. Brit. Mus. p. 110 (1878).

This species, which is only known with certainty to occur in Nepal and Masuri, was first described by Mr. Hodgson from the former locality in 1844. He presented a specimen of it to the British Museum, and another to the Asiatic Society which is now in the collection of the Indian Museum. These are the only two known examples of the species from Nepal. Mr. Hodgson mentions that *Rhinolophus macrotis* has no pubic false teats, and he gives the weight of his type specimen as one-third of an ounce.

In the following table, measurements of examples of this species from various sources are contrasted. In column I. are entered Mr. Hodgson's original measurements, II. contains those given by Mr. Blyth of a female example sent by Mr. Hodgson to the Asiatic Society, III. shows Captain Hutton's results for recent examples captured at Masuri, and IV. contains Dr. Dobson's measurements of an adult male sent by Captain Hutton from Masuri to the Asiatic Society. Dimensions in inches.

	I.	II.	III.	IV.
Head and body .....	1·75	1·62	2·37 to 2·5	1·7
Head.....	0·75	0·63	—	0·75
Ear from antea base... ..	0·93	0·62	1·0	0·85
Interval of ears... ..	0·25	—	—	—
Tail.....	0·75	0·63	0·87	0·8
Humerus.....	1·0	—	—	—
Radius.....	1·5	1·62	1·7	1·6
Third finger.....	2·3	2·25	2·37	2·2
Femur.....	0·62	—	—	—
Tibia.....	0·62	0·63	0·7 to 0·75	0·7
Expanse.....	9·75	—	9	—
Foot.....	—	0·37	—	0·35

It will be seen that Captain Hutton's dimensions considerably exceed those given by the other authorities. The most noteworthy divergence is in the length of the head and body, but Hutton expressly says that his measurements are taken from fresh specimens, so that part at least of the discrepancy may be accounted for by the shrinking of specimens preserved in alcohol.

Mr. Hodgson does not give any particular account of the habits of this species in Nepal. Hutton's note about the manners of these bats in Masuri is this, "They come out of the caves in the earlier twilight hours, and may be seen flitting rapidly at some height in the air, chasing the small flies and beetles which abound during the rainy season."

Dr. Dobson mentions that the type of *Rhinolophus macrotis* is in the collection of the Indian Museum. There are three specimens of this species in that collection, an adult female in alcohol presented by Mr. Hodgson in 1842, from Nepal, which has been mentioned above; and two adult males in alcohol from Masuri, presented by Captain Hutton in 1852. The Nepal specimen is therefore doubtless the type as understood by Dr. Dobson, but this fact is not mentioned in the catalogue appended to his Monograph, nor in Dr. Anderson's 'Catalogue of Mammalia in the Indian Museum' (1881).

## 6. RHINOLOPHUS AFFINIS.

*Rhinolophus affinis*, Horsfield, Zool. Research. Java, (1824); Dobson, Mon. As. Chir. p. 47 (1876); Cat. Chir. Brit. Mus. p. 112 (1878).

This species is entered here with considerable doubt. The only ground for its inclusion is an entry in the 'Catalogue of Chiroptera in the British Museum' of a specimen of *Rh. affinis* from "Nipal," presented by Mr. Hodgson. It is quite possible that the locality quoted merely rests on the evidence of an erroneous museum label, and that the specimen was really procured by Mr. Hodgson in Darjiling, where *Rh. affinis* appears to be common. No synonym is quoted under the entry of this particular specimen to show that it ever bore a name bestowed by Mr. Hodgson; and specimens of *V. mystacinus*, *Megaderma lyra*, and *Plecotus auritus*, certainly obtained by Mr. Hodgson in Darjiling or the Sikkim Tarai, and never in Nepal, are in that work entered as from Nepal.

A reference to the register of the British Museum would settle the question; for, if the specimen of *Rh. affinis* presented by Mr. Hodgson was only received in 1847, or on any subsequent date, it could not have been collected in Nepal.



However, the species is very likely to be found in Nepal, as it occurs both east and west of that country in the Himalayas, at Darjiling and Masuri.

#### 7. RHINOLOPHUS MINOR.

*Rhinolophus minor*, Horsfield, Zool. Res. Java (1824); Dobson, Mon. As. Chir. p. 50 (1876), Cat. Chir. Brit. Mus. p. 114 (1878).

*Rhinolophus subbadius*, Hodgson, Blyth, Journ. As. Soc. Beng. vol. xiii, pt. i, p. 486 (1844).

In a catalogue of the mammals of Nepal by Mr. Hodgson, printed in Journ. As. Soc. Bengal, Vol. X. Pt. II, p. 909 (1841), a species called *Vespertilio subbadia* is mentioned. The description of this form as *Rhinolophus subbadius* only appeared three years later, as cited in the above synonymy. Dr. Dobson does not notice the title of *Rhinolophus subbadius* at all, either in his 'Monograph' or 'Catalogue of Chiroptera in the British Museum.' It will be useful to recall the descriptions and measurements given by Hodgson and by Blyth of *Rh. subbadius*. The account given by the former author is too vague to fix the species, but he fortunately sent a specimen of it to the Asiatic Society, which Blyth described in the paper in which Hodgson's diagnosis appeared.

Hodgson says that, in his species, the ears are not longer than the head, are truncated at the tip [or somewhat obtusely pointed], and ovoid. Nasal appendage quadrate, not salient, with a transverse bar nearly surmounting it towards the head. Blyth's diagnosis is, Anterior nose leaf very small, oblong, rounded above. Vertical membrane conspicuously developed, and pointed posteriorly. Behind vertical membrane a short and broad transverse membrane, divided into two lateral lobes. Hindmost angular peak with sides slightly emarginated towards the point. Nostrils not externally fringed with membrane. Over the lip is the usual horse-shoe. The following are the measurements given (a) by Hodgson and (b) by Blyth of this Nepalese species.

	(a)	(b)
Length, head and body.....	1.5 ...	1.25
„ tail.....	1.25 ...	0.62
„ head.....	0.62 ...	0.62
„ ear.....	0.62 ...	0.5
„ forearm.....	1.25 ...	1.37
„ third finger.....	2.25 ...	1.88
„ tibia.....	— ...	0.62
„ foot.....	0.37 ...	0.31
Expanse.....	7.5 ...	—

No specimen of *Rh. subbadius* was presented by Hodgson to the British Museum; the example he gave to the Asiatic Society was entered in Blyth's Catalogue (p. 25) as No. 69 A. This number seems to have been accidentally removed from the specimen, and it cannot now be traced with certainty. I shall refer to this specimen later on.

I obtained an example of this species in the Nepal Valley which gave the following measurements. Length head and body 1·5 inch, tail 0·75, head 0·7, ear, 0·65, nose-leaf  $0·44 \times 0·28$ , forearm 1·4, thumb 0·23, third finger, metacarpal 1·1, first phalanx 0·43, second phalanx 0·65, fifth finger, metacarpal 1·13, first phalanx 0·36, second phalanx 0·45, tibia 0·62, foot and claws 0·3.

Ears subacutely pointed; antitragus separated by a deep angular notch. Posterior connecting process acutely pointed, considerably exceeding the vertical process of the sella in height. Terminal process of posterior nose leaf narrow and emarginate. Lower lip with three vertical grooves. Second lower premolar in the tooth row. Second upper premolar rather widely separated from the canine, and the first upper premolar standing in the tooth row. Wing membrane to tibia, 0·1 above ankle-joint.

I have no doubt that this specimen represents *Rh. subbadius* of Hodgson, and I think it is also certainly an example of the variable *Rh. minor* of Horsfield. I have compared my Nepalese specimen with examples of *Rh. minor* in the British Museum, named by Dr. Dobson. The sella is exactly the same shape, but the ears are rather larger and the horizontal nose-leaf, or horse-shoe, is slightly larger, and conceals the lip more. These slight differences are not of much importance, and I believe *Rh. subbadius*, Hodgson, may be safely considered a synonym of *Rh. minor*.

With regard to the original specimen received by the Asiatic Society from Mr. Hodgson, I have already said that it cannot be traced with certainty. In the catalogue of specimens appended to Dr. Dobson's Monograph, No. 69A of Blyth's Catalogue is not accounted for; but three specimens of *Rh. minor* are entered of which the locality, date, and donor are unknown. These bats came to the Indian Museum from the Asiatic Society, and of one of them Dr. Dobson notes that the sex is undeterminable, and that it is in a dilapidated condition. It is possible that this specimen is the type of *Rhinolophus subbadius*, received from Mr. Hodgson in 1832. In noticing these three specimens of *Rh. minor*, Dr. J. Anderson mentions that they are *types* (Cat. Mamm. Ind. Mus. 1881, p. 110).

This species does not appear to be common in the Nepal Valley; I noticed it only on a few occasions, and Mr. Hodgson does not furnish

any notes about its habits. Captain Hutton records it from Masuri, but the measurements he gives of his specimens are not reconcilable with the known dimensions of *Rh. minor*. He gives the length of head and body as from 3 inches to 3·25, &c. I think the specimens whose dimensions he records could not have been *Rh. minor*.

#### 8. RHINOLOPHUS FERRUM-EQUINUM.

*Vespertilio ferrum-equinum*, Schreb., Säugeth. i, p. 174 (1775).

*Rhinolophus tragatus*, Hodgson, Journ. As. Soc. Beng. vol. iv, p. 699, (1835).

*Rhinolophus ferrum-equinum*, Dobson, Mon. As. Chir. p. 53 (1876); Cat. Chir. Brit. Mus. p. 119 (1878).

This species is fairly common in Nepal. The following particulars are extracted from Mr. Hodgson's original description of his *Rh. tragatus*, obtained in the Nepal Valley:—Length of head and body 2·62 inches, tail 1·87, expanse 15·5, weight 2 ounces. The pubic false teats are strikingly developed, and have the same shape as the true pectoral teats, but even exceed them in size. The ears are “tremblingly alive all over” and capable of considerable movement and compression. “So soon as it is dark, they come forth from the cavities of rocks, in groups, to skim the surface of standing crops, or to glide around and between umbrageous trees, in search of nocturnal insects, which constitute their sole food. They make their exit rather sooner than the true bats [*Vespertilionidæ*], and always in considerable numbers. They are not migratory, nor subject to hibernation. They breed once a year, towards the close of summer, and produce two young, differing from the parents chiefly in the very restricted development of the nasal appendages.”

These remarks on habits must of course be understood as applying only to Nepal and regions having a similar climate. In Gilgit, for instance, where the winter is much colder than in the Nepal Valley, *Rh. ferrum-equinum* certainly hibernates [*see my paper on the Mammals of Gilgit*, P. Z. S. 1881, p. 199].

#### 9. PHYLLORHINA ARMIGERA.

*Rhinolophus armiger*, Hodgson, Journ. Asiat. Soc. Beng. vol. iv, p. 699 (1835).

*Phyllorhina armiger*, Dobson, Monogr. Asiat. Chir. p. 64 (1876); Cat. Chir. Brit. Mus. p. 135 (1878).

Mr. Hodgson was the first to name and describe this bat, from specimens obtained by him in Nepal, of which he presented three to the British Museum. This fine species is very common in the Nepal Valley at all seasons. Owing to its large size and peculiar method of hunting for its prey, its habits can be readily observed. In the following table



detailed measurements of eleven examples which I preserved are set forth. It is somewhat remarkable that more than four-fifths of the total number secured should have been females.

	♂	♂	♀	♀	♀	♀	♀	♀	♀	♀	♀
Length, head and body.....	4.0	4.1	3.8	4.1	3.65	3.63	3.7	3.9	3.6	4.0	4.0
"    tail.. .....	—	2.25	2.35	2.1	2.2	2.4	2.4	2.3	2.4	2.4	1.9
"    head.....	1.27	1.34	1.34	1.3	1.34	1.3	1.3	1.3	1.3	1.28	1.4
"    ear (anteriorly) . . . .	1.17	1.15	1.17	1.2	1.2	1.1	1.1	1.15	1.16	1.25	1.23
Breadth of ear (anteriorly)..	0.94	0.9	0.95	1.1	0.95	0.94	0.93	1.0	0.96	1.0	1.0
Length, forearm... ..	3.45	3.45	3.5	3.4	3.5	3.43	3.56	3.6	3.45	3.4	3.6
"    thumb and claw....	0.47	0.54	0.55	0.55	0.54	0.55	0.53	0.55	0.53	0.55	0.55
"    third finger .....	4.53	4.7	4.7	5.3	4.65	4.67	5.2	4.9	4.75	4.65	4.95
"    fifth finger... ..	3.68	3.7	3.65	3.75	3.8	3.73	3.8	3.85	3.7	3.65	3.85
"    tibia.....	1.5	1.5	1.4	1.45	1.4	1.4	1.53	1.42	1.44	1.43	1.56
"    calcaneum .....	—	0.87	0.93	0.82	0.85	0.83	0.8	0.87	0.8	0.82	0.97
"    foot and claws....	0.65	0.7	0.7	0.72	0.65	0.73	0.74	0.73	0.67	0.65	0.7
Expanse .....	21.4	—	23.3	21.5	21.0	21.3	22.0	22.3	21.5	21.0	2.02

In all the specimens the glandular frontal sac is distinct, but is smaller in the females than in the males. The wing-membrane is attached to the tibia above the ankle-joint, and the distal end of the calcaneum is distinctly marked in all. Pubic warts are present in six of the females, but are absent in the three remaining examples of this sex; in one case a pubic wart measures 0.28 inch in length. Hodgson found the weight of his type specimen (a male) to be 3 ounces; in the only specimen I weighed, an adult female, I found the weight 1.5 oz. or just half the figure Mr. Hodgson gives.

This bat usually harbours during the day in caves, or commonly in lofts, out-houses, and sheds that are little used; in the latter localities it suspends itself, by the claws of the feet, from the rafters. When attaching itself in this way to the edge of a beam or rafter, the animal sways, pendulum-like, a few times until the impetus given during flight is exhausted; and it then hangs motionless with its wings folded close to the body. If slightly alarmed by the opening of a door, or any unusual noise in the room it occupies, the head is thrust out and turned carefully in various directions, as if for the purpose of finding out the cause of disturbance. On such occasions I have purposely dropped a heavy book on the floor so as to alarm the bat thoroughly. The animal would at once fly off and either take several turns round the room, or else leave it; but it invariably returned quickly and attached itself to the spot it had previously occupied.

It comes out for the capture of its prey about sunset, and its hunting grounds are gardens, orchards, cleared spaces in woods, or avenues

of trees ; somewhere near trees always. It is sometimes found flying on a level with the tops of the trees, but more commonly nearer the ground ; a very characteristic movement it has is a slow but steady sweep round a leafy tree, or clump of trees, in search of insects which frequent the lower branches. While it was intently occupied in this circular flight I have been nearly touched on the face by this bat, as I walked across the grounds attached to my house in Nepal. And in passing so close to one it could be distinctly heard crunching the hard-bodied insects it had caught, between its strong teeth.

Sometimes these bats seem to come out of their day retreat before the insects they are in search of are to be found in plenty. On the 25th August about 6 P. M., I noticed an example of *Phyllorhina armigera* flying close to a tree. It circled twice round the tree while I was watching it, keeping about three feet above the ground. Apparently finding that none of the insects it wanted were about, it suspended itself to a small horizontal branch of the tree, just  $3\frac{1}{2}$  feet above the ground, and so remained for some time. It was probably waiting for a more propitious hour. Whether this was really the explanation of the pause in its flight or not, it seems certain that this bat does not ordinarily remain very long on the wing. I have often observed that in the early part of the night it alternated its pursuit of insects with short periods of repose in an out-house. On one occasion, I observed a bat of this species return three times during the evening (from about 8 to 10 P. M.) to a room I happened to be occupying ; and curiously enough it always attached itself to precisely the same part of the ceiling. That part of the room, however, was the point furthest away from me, and my presence may have influenced the bat in its selection of the most quiet spot.

On another occasion, one of these bats had suspended itself to the ceiling of my study late at night, and it first attracted attention by the pattering of its droppings on the floor. On being alarmed at some noise I made in moving books, it quitted its perch and flew lumberingly round the small room. It soon ended by knocking itself violently against a wall and then fell on the floor, apparently exhausted and stunned. When I approached it, however, it flew up and once more hooked on to a beam exactly where it had been before. It does not enter lighted rooms in houses so commonly as so many other species of bats do. Indeed, on the rare occasions when I have found it in this way, its object in coming in was evidently for rest merely, either temporarily or for the night.

When captured alive (a large butterfly-net answers for this purpose), this bat has a fierce and forbidding aspect owing to its depressed

muzzle and prominent canine teeth; the ears are kept in quick tremulous motion, and there is also frequent but slight movement of the facial crests. The animal is easily shot during its flight, and most of my specimens were obtained in this way.

Hodgson says that *Phyllorhina armigera* breeds once a year, towards the close of summer, and produces two young, differing from the parents chiefly in the very restricted development of the nasal appendages. I made no observations on this point, but I note that in a female specimen captured on the 27th July, the pectoral teats, which are situated near the anterior margin of the axilla, are enlarged.

#### 10. PHYLLORHINA FULVA.

*Hipposideros fulvus*, Gray, Mag. Zool. and Bot. ii, p. 492 (1838).

*Phyllorhina fulva*, Dobson, Monogr. Asiat. Chir. p. 71 (1876); Cat. Chir. Brit. Mus. p. 149 (1878).

The following particulars are derived from three examples of this bat captured in the Nepal Valley on the 21st and 22nd August, and the 10th of January:

	♀	♀	♂
Length, head and body	2·0	2·1	1·9
„ tail.....	1·2	1·4	1·35
„ head.....	0·75	0·75	0·75
„ ear.....	0·85	0·82	0·9
„ forearm... ..	1·6	1·64	1·6
„ third finger....	2·45	2·5	2·4
„ fifth finger.....	2·15	2·14	2·0
„ tibia... ..	0·73	0·75	0·72
„ foot.....	0·33	0·34	0·3
„ calcaneum .....	0·35	0·4	0·37
Expanse .....	10·2	10·0	—

Nothing in the coloration of these specimens recalls Mr. Blyth's remark (J. A. S. B. XIII, Pt. i, p. 489, 1844) that this species is perhaps the most vividly coloured of the whole class of mammalia. The fur is long, dense, and soft, above smoky brown, the hairs white at their bases; below paler, especially on the throat. Ears and membrane dusky. Wing-membrane from the tarsus.

These examples agree well with specimens of *Phyllorhina fulva* in the British Museum, named by Dr. Dobson. That author considers that *Ph. fulva* is only a variety of *Ph. bicolor*, and on this point I cannot offer any useful opinion. But *Ph. amboinensis*, which he also regards as a variety of *Ph. bicolor*, seems to me quite distinct from *Ph. fulva*.



This species is not uncommon in the Nepal Valley, although Mr. Hodgson never obtained it. It often comes into lighted rooms at night to hunt for insects. While being pursued in a room, it constantly flies very low down, not more than a couple of feet from the floor. It is a permanent resident in Nepal and does not hibernate there.

### 11. PHYLLORHINA AMBOINENSIS.

*Phyllorhina amboinensis*, Peters, M. B. Akad. Berl. 1871, p. 323; Dobson, Mon. Asiat. Chir. p. 72 (1876); Cat. Chir. Brit. Mus. p. 150 (1878).

*Phyllorhina micropus*, Hutton, Proc. Zool. Soc. 1872, p. 703.

I captured two specimens of this bat in the Nepal Valley on the 22nd of October; the animals had entered a lighted room on the ground floor about 9 o'clock in the evening.

The following are dimensions of these examples—both females—in inches:—

	1	2
Length, head and body .....	1·6	1·7
„ tail..... .....	1·03	1·0
„ head..... .....	0·65	0·65
„ ear..... .....	0·63	0·62
Length, forearm... .....	1·40	1·37
„ third finger..... .....	2·0	2·1
„ fifth finger..... .....	1·8	1·78
„ tibia..... .....	0·58	0·57
„ foot..... .....	0·27	0·27
„ calcaneum... .....	0·26	0·3
Expanse..... .....	8·9	8·9

These specimens agree well with a bat in the collection of the British Museum, from Lingasugur in the Deccan, which had been compared with the type of *Phyllorhina amboinensis* in the Berlin Museum by Dr. Dobson. In the Nepalese specimens the wing-membrane is attached to the tarsus.

Mr. Hodgson never obtained this species in Nepal.

Captain Hutton observes that it occurs in the summer months both in the lower hills near Masuri and in the Dehra Doon. He adds that one was taken on a warm evening in September, having flown in to the lights in a room, and another was taken at the foot of the hills, in the same way, in October; but that it is by no means common,

## 12. VESPERUGO NOCTULA.

*Vespertilio noctula*, Schreb., Säugeth. i, p. 166 (1775).

*Vespertilio labiata*, Hodgson, Journ. Asiat. Soc. Beng. vol. iv, p. 700 (1835).

*Vesperugo noctula*, Dobson, Mon. Asiat. Chir. p. 88 (1876); Cat. Chir. Brit. Mus. p. 212 (1878).

Mr. Hodgson appears to have obtained only one specimen of this bat in Nepal, the type of his *Vespertilio labiata*, now in the collection of the British Museum. In his description, he says that the colour of the fur is saturate brown throughout and that of the skin, wherever uncovered by hair, purpurascens. His measurements are, length of head and body 3 inches, tail 2, and expanse 15.

I only secured a single specimen of *Vesperugo noctula* in the Nepal Valley, on the 2nd of July, in the following manner. About 8 o'clock in the evening, I heard the very shrill scream of some small animal in my bedroom, and, on going into the room, I found this bat attached to the mosquito-net covering my bed. In its flight, it had apparently alighted on the net, and there got its claws so firmly entangled that it could not escape.

The following are the measurements of this specimen:—length, head and body 3·1, tail 2·1, head 0·9, ear 0·75 × 0·6, tragus 0·3 × 0·13, forearm 2·05, thumb 0·34, third finger 3·65, fifth finger 2·2, tibia 0·75, calcaneum 0·7, foot and claws 0·45; expanse 15·0.

The colour of the fur above is rich olive-brown, beneath paler brown, and the fur on the membranes is buff. Ears and membranes dusky.

*Vesperugo noctula* is, I think, not common in the Nepal Valley. Mr. Hodgson says that it is found there throughout the year, does not hibernate, and quests for food solitarily.

## 13. VESPERUGO ABRAMUS.

*Vespertilio abramus*, Temminck, Monogr. Mammal. ii, p. 232 (1835).

*Scotophilus fuliginosus*, Gray, Cat. Hodgson's Collect. Brit. Mus. p. 4 (1845).

*Vesperugo abramus*, Dobson, Mon. Asiat. Chir. p. 97 (1876); Cat. Chir. Brit. Mus. p. 226 (1878).

This is a very common species in the Nepal Valley, where it is to be found at all seasons. It is very active in hunting over gardens and woods, and its flight is quick. It often enters houses at night, in pursuit of insects attracted by lights. The breeding season would appear to be in the cold weather; for none of the adult specimens captured from May to August showed any sign of rutting, but a male secured in November was evidently in rut.

The following are dimensions and some particulars of the specimens preserved:—

	♂	♂	♂	♀	♀	♂	♀
Length, head and body....	1·73	1·8	1·8	1·9	1·8	1·79	1·82
„ tail.....	1·45	1·4	1·5	1·63	1·55	1·37	1·55
„ head.....	0·6	0·64	0·6	0·63	0·65	0·63	0·63
„ ear.....	0·5	0·5	0·5	0·58	0·55	0·5	0·53
„ tragus..	0·22	0·21	0·22	0·25	0·21	0·23	0·22
„ forearm..	1·29	1·28	1·3	1·3	1·3	1·28	1·3
„ thumb..	0·25	0·25	0·3	0·25	0·24	0·24	0·27
„ third finger....	2·35	2·4	2·4	2·55	2·45	2·3	2·5
„ fifth finger .....	1·6	1·7	1·7	1·77	1·75	1·65	1·8
„ tibia.....	0·52	0·5	0·5	0·6	0·51	0·5	0·53
„ foot and claws .....	0·26	0·26	0·27	0·3	0·26	0·27	0·25
Expanse.....	8·8	9·0	10·0	10·1	9·0	8·9	9·7

Fur above dark olive-brown, below paler and rather rufous brown; basal part of fur above and below blackish. Membranes dusky. In a male captured on the 8th November the testes appear in the form of oval bodies, 0·3 inch in length, placed on each [side of the base of the tail, below, in a temporary scrotum. In this specimen, the colour of the fur differs perceptibly from that of the other examples. The fur above is a rich brown, with a wash of gold-colour in parts, due to the hairs being pale-tipped; below, the colour is sandy brown. The tips of the claws are pure white. On comparing these Nepalese examples with specimens of *V. abramus* in the British Museum, I could not detect any appreciable differences in the shape or position of the teeth, or in any other specific characters.

Mr. Hodgson presented five examples of *Vesperugo abramus*, obtained in Nepal, to the British Museum; but he does not appear to have discriminated the species, as he gave no name to it. The specimens were entered in the Catalogue of Hodgson's collection, by Dr. J. E. Gray, as *Scotophilus fuliginosus*, with *Vespertilio fuliginosus*, Hodgson, as a synonym. The latter title is really a synonym of *Miniopterus schreibersii*, as is proved by Hodgson's original description.

#### 14. HARPYIOCEPHALUS LEUCOGASTER.

*Murina leucogaster*, Alph. Milne-Edwards, Nouv. Arch. Mus. vii, Bull. p. 91 (1871); Mammif. du Tibet. p. 250 (1872).

*Harpyiocephalus leucogaster*, Dobson, Monogr. Asiat. Chir. p. 157 (1876); Cat. Chir. Brit. Mus. p. 283 (1878).

I obtained a single specimen of this bat in the Nepal Valley,



on the 2nd of September. It was found dead in my room, early in the morning, and had probably killed itself by dashing against a wall.

Length, head and body 1·85 inch, tail 1·4, head 0·7, ear 0·6, tragus 0·3, forearm 1·25, thumb 0·4, third finger 2·4, fifth finger 1·85, tibia 0·65, foot and claws 0·33; expanse 9·3.

Ears oval, broadly rounded above; the inner margin convex, with a distinct spur-shaped process near its base, which projects forwards towards the posterior angle of the eye; outer margin convex.

Wing-membrane to base of distal phalanx of outer toe. Interfemoral membrane angularly emarginate at termination of calcaneum; extreme tip of tail projecting.

Fur golden-orange on head, the base of the hairs greyish; on the back pale rufous brown, grey at the base. Fur on membranes bright ferruginous, the upper surface of the interfemoral membrane and toes being well covered. Beneath, the fur is white throughout on the chin and throat, the rest of the lower parts having bicoloured fur—grey at the base with white tips.

Upper inner incisor longer than outer incisor and not touching the canine at the base; from the outer side of its base a cusp projects inwards. First upper premolar in the same plane as the canine and second premolar, about equal to the latter in vertical height and about three-fourths of its size in cross section.

Nose, lower lip, and sides of head to ears, nude and dark fleshy; membranes brownish black, but orange-coloured along forearm. Compared with a specimen of *H. leucogaster* in the British Museum, from Tibet, the ears, teeth, and thumb and claw are of the same size and shape. The only difference observable is in the colour of the fur, which is very ferruginous above in the Nepal specimen and brown in the animal from Tibet. As the two specimens must certainly be referred to the same species, it would seem that the colour of the fur is no more a reliable character in this species of *Harpyiocephalus* than in other Chiroptera (*cf.* Dobson, *Cat. Chir. Brit. Mus.* p. 284).

Mr. Hodgson did not obtain this species in Nepal. Of its habits in the north-west Himalayas, Captain Hutton says that it occurs at an elevation of about 5,500 feet, but does not appear to be common in the hills, the Dehra Doon being probably its true locality there. An example which flew into a room at Jeripani (below Masuri), at night, kept low down in its flight, instead of soaring towards the ceiling, passing under the tables and chairs, as if afraid to emerge into the broad glare of the lamps. "This likewise is the mode of flight when searching for insects in the open fields, where it skims closely and

somewhst leisurely over the surface of the crops and grass" (P. Z. S. 1872, p. 712).

### 15. VESPERTILIO NIPALENSIS.

*Vespertilio pallidiventr*is, Hodgson, Calc. Journ. Nat. Hist. vol. iv, p. 286 (1844), (name only); Gray, Cat. Hodgson's Collect. Brit. Mus. p. 4 (1846) (not described).

*Vespertilio pallidiventer*, Gray, Cat. Hodgson's Collect. Brit. Mus. 2nd Ed. p. 2 (1863) (name only).

*Vespertilio nipalensis*, Dobson, Proc. Asiat. Soc. Beng. 1871, p. 214; Mon. Asiat. Chir. p. 141 (1876); Cat. Chir. Brit. Mus. p. 302 (1878).

The name *Vespertilio pallidiventr*is first occurs in a list of the mammals of Nepal by Mr. Hodgson, published in the 'Calcutta Journal of Natural History' in 1844. Although the name given by Mr. Hodgson to this Nepalese species of bat appears in several lists subsequent to that date, he never gave any description of the animal. As he did not present any examples of it to the British Museum or the Asiatic Society, I imagine that he only obtained one specimen, which must have been lost, somehow, after it was figured. There is a well executed figure of *V. pallidiventr*is in the collection of plates of Mammals of Nepal presented by Mr. Hodgson to the Zoological Society of London.

In 1871, a collector of the Indian Museum obtained a bat in Kathmandu, which Dr. Dobson described as a new species under the name of *V. nipalensis*, the type and only known specimen being an adult female example, preserved in spirit, and now in the Indian Museum, Calcutta. I have carefully examined Hodgson's original plate of *V. pallidiventr*is, with Dr. Dobson's description and figure of *V. nipalensis* before me, and, so far as any conclusion can be arrived at on such data, I believe that both these names apply to the same species. The plate of *V. pallidiventr*is represents a true *Vespertilio*, as evidenced by the shape of the ear and by the narrow, acutely pointed tragus; and the whole lower surface of the animal is coloured *pure white*. This white colour of the under-parts is perhaps the most marked feature in *V. nipalensis*. And, Dr. Dobson's type specimen having come from the very place where Mr. Hodgson obtained his *V. pallidiventr*is, there can be no reasonable doubt about Hodgson's title having priority. But as the latter naturalist never defined his species by any description however short, or was helped to a definition by any writer before the name *V. nipalensis* was published, *V. pallidiventr*is must be regarded as a synonym merely, under the accepted rules of zoological nomenclature.

Nothing is recorded about the habits of *V. nipalensis*. It appears

to be restricted to Nepal, and, from what has been said above, it would seem that it is not common even in its only known habitat. A full description of the animal, with measurements of the type, is given in Dr. Dobson's works above cited.

#### 16. VESPERTILIO FORMOSUS.

*Vespertilio formosa*, Hodgson, Journ. As. Soc. Beng. vol. iv, p. 700 (1835).

*Vespertilio formosus*, Dobson, Mon. Asiat. Chir. p. 140 (1876); Cat. Chir. Brit. Mus. p. 311 (1878).

In his original description of this species from Nepal, Mr. Hodgson gives the following measurements of the type specimen: length of head and body 2·5 inches, tail 2, expanse 12·5. He notes that the animal has a sharp visage, and that the nasal bones are slightly convexed and unite easily with a low forehead, in this respect contrasting with his *Vespertilio fuliginosa* (*Miniopterus schreibersii*).

Of the habits of *V. formosus* in the Nepal Valley, Mr. Hodgson merely records that it remains there throughout the year and does not hibernate; and that it quests for food solitarily.

In the Himalayas, this bat seems to be common at Darjiling, and in Dehra Doon, and Lower Masuri; but I think it does not occur plentifully in the Nepal Valley, as only one example appears to have been obtained by Mr. Hodgson (the type, now in the British Museum), and I never secured a specimen there.

#### 17. VESPERTILIO MYSTACINUS.

*Vespertilio mystacinus*, Leisler, Kuhl, Deutsch. Flederm. Ann. Wetterau. Naturk. iv, p. 55 (1819); Dobson, Monogr. Asiat. Chir. p. 133 (1816); Cat. Chir. Brit. Mus. p. 314 (1878).

This is one of the commonest bats in the Nepal Valley. It may be seen every evening throughout the year, flying rather high in the air; and it frequently enters houses at night for a short hunt near lamps or other lights. On such occasions, two individuals are often found associated. Ten examples were secured from June to November. Of these eight are adult (5 ♂, 3 ♀), and, though they were captured in the months of June, July, August, September, and October, they do not show any sign of breeding. In none of the males are the testes descended, and in the females the mammæ are not enlarged. An immature female was obtained on the 30th June, and a very young male, just able to fly, on the 3rd July. The following table shows the dimensions of the adult specimens:—



	♂	♂	♂	♂	♂	♀	♀	♀
Length, head and body ...	1·9	1·8	1·7	1·5	1·5	2·0	1·95	1·9
tail.....	1·4	1·55	1·6	1·5	1·55	1·5	1·45	1·6
head.....	0·6	0·6	0·6	0·58	0·6	0·63	0·6	0·61
ear.....	0·5	0·5	0·57	0·5	0·5	0·51	0·53	0·52
tragus.....	0·27	0·23	0·26	0·25	0·25	0·24	0·24	0·26
forearm.....	1·38	1·34	1·4	1·32	1·35	1·4	1·35	1·43
thumb.....	0·28	0·29	0·27	0·28	0·26	0·27	0·27	0·27
third finger..	2·25	2·26	2·2	2·17	2·2	2·15	2·27	2·3
fifth finger.....	1·74	1·7	1·7	1·73	1·7	1·75	1·75	1·8
foot and claws ..	0·3	0·34	0·37	0·4	0·34	0·37	0·36	0·4
calcaneum.....	0·6	0·6	0·57	0·57	0·55	0·55	0·6	—
Expans.....	9·5	—	9·4	9·3	9·5	9·5	9·7	10·0

Fur above dark brown ; beneath ashy, the basal part of the hairs being black. Muzzle, ears, and membranes dusky, with a purplish tint. The specimen whose dimensions are entered in the third column above differs from all the others in having the forehead rather abruptly raised above the face line, the ears longer, and the third finger differently proportioned. The metacarpal bone is longer than in any of the other examples, but the first phalanx of the third finger is shorter, measuring 0·4, while in the other specimens it varies from 0·5 to 0·55. On a comparison of specimens at the British Museum, I find an example of *V. mystacinus* in that collection with the third finger proportioned as in this abnormal individual ; and all these Nepalese bats agree perfectly with the common *V. mystacinus* in shape of ear and tragus, and in other essential characters.

Considering how common this bat is in Nepal, it is very singular that Mr. Hodgson never seems to have obtained a specimen of it there. His first acquaintance with the species was made years after he left Nepal, when he procured it at Siligori, in the Sikkim Tarai, and named it *Vespertilio siligorensis*.

18. VESPERTILIO MURICOLA.

*Vespertilio muricola*, Hodgson, Journ. Asiat. Soc. Beng. vol. x, pt. ii, p. 908 (1841) (name only) ; Gray, Cat. Hodgson's Collect. Brit. Mus. p. 4 (1846) ; Dobson, Monogr. Asiat. Chir. p. 134 (1876) ; Cat. Chir. Brit. Mus. p. 316 (1878).

*Vespertilio adversus*, apud Hutton, Proc. Zool. Soc. Lond. 1872, p. 710.

This is another species from Nepal which Mr. Hodgson named but never described. He presented three examples of it, obtained in the Nepal Valley, to the British Museum, and of these Gray noted in the catalogue above quoted, "Feet large, elongate, half free; tragus elongate, lanceolate, subfalcate;" no measurements or other diagnostic particulars are given. It is difficult to see how this can be considered a

definition of the species, and yet I believe it is the only description we had of Hodgson's *V. muricola* before the appearance of Dr. Dobson's 'Monograph.' That author has satisfied himself that the title *Vespertilio caliginosus* of Tomes, dating from 1859, as well as three or four other defined names published before the appearance of his monograph, really apply to the species named, but not described, by Hodgson as *V. muricola*. Under these circumstances it seems doubtful whether Hodgson's title can be retained for the species; but, as Dr. Dobson has used the name of *V. muricola* in his two important works, and changes in nomenclature are to be deprecated, I have here followed his example.

On a comparison of specimens, *V. muricola* is readily distinguished from *V. mystacinus* by the shape of the tragus. In the former, the tragus is concave on its inner margin, and is decidedly inclined inwards and rather forwards; while in *V. mystacinus* the tragus is more erect and has a straight inner margin.

Nothing is recorded about the habits of this species in Nepal, but Captain Hutton writes, "This is a common species at Mussooree and in the Dehra Doon. It is early on the wing, coming out of caves and hollow trees, flying high, and is very rapid in its movements."

#### 19. MINIOPTERUS SCHREIBERSII.

*Vespertilio schreibersii*, Natterer in Kuhl, Deutsch. Flederm. Wetterau. Ann. iv p. 41 (1819).

*Vespertilio fuliginosa*, Hodgson, Journ. Asiat. Soc. Beng. vol. iv, pp. 700 and 701 (1835).

*Miniopterus schreibersii*, Dobson, Monogr. Asiat. Chir. p. 160 (1876); Cat. Chir. Brit. Mus. p. 348 (1878).

Mr. Hodgson, in describing his *Vespertilio fuliginosa*, says that in size it is somewhat smaller than *Vespertilio formosa*, and with the ears, lips, and muzzle as in the latter species. The face is sharp, but the rostrum is somewhat recurved, owing to the concave bend of the nasal bones which join a high forehead with a considerable curve. He notes that the dentition of *V. fuliginosa* is  $\frac{2-2}{6}$ ,  $\frac{1-1}{1-1}$ ,  $\frac{5-5}{6-6}$ , thus differing from *V. formosa* and *V. labiata* (= *V. noctula*), in which the molar series is  $\frac{6-6}{6-6}$ . The colour, he says, is wholly sooty brown.

This description is sufficient to show that Hodgson was referring to *Miniopterus schreibersii*. In Gray's 'Catalogue of Hodgson's collection in the British Museum' (1846, p. 4), six specimens of bats from Nepal

are entered under the name of Sooty Scotophile (*Scotophilus fuliginosus*), with a remark that the feet are very small, in the wing to the base of the toes. This attachment of the wing-membrane would not apply to *M. schreibersii*, in which that membrane only reaches the ankle; but Dr. Gray appears to have suspected that he was including two species under one name, for he adds, “*a.—e.* Specimens in spirit. *f.* A specimen with a rather larger tragus, without any small lobe at the outer side of its base.” The last-mentioned specimen was probably the type of Hodgson’s *V. fuliginosa*, and I am rather surprised not to find it figuring in the list of specimens of *M. schreibersii* in the latest catalogue of bats in the British Museum. As has before been mentioned, the first five specimens called by Dr. Gray *Scotophilus fuliginosus* are really examples of *Vesperugo abramus*.

I obtained a single specimen of *M. schreibersii* in the Nepal Valley, on the 8th of February, which gave the following measurements:—

Length, head and body 2·2 inches, tail 2·2, head 0·7, ear 0·52, tragus 0·24, forearm 1·9, thumb 0·3, third finger 3·52, first phalanx of third finger 0·45, fourth finger 2·6, fifth finger 2·1, tibia 0·75, foot and claws 0·4, calcaneum 0·55; expanse 13·5.

The fur is rich dark brown above, and pale brown on the lower surface; the basal part of the fur being everywhere blackish brown. This example was secured in a curious way. I shot a crow (*Corvus splendens*) one evening in my garden, and as it fell a bat dropped from its claws, which proved to be *M. schreibersii*. The bat had evidently just been captured and killed by the crow, probably out of sheer mischief.

Mr. Hodgson says that this species remains in Nepal throughout the year and does not hibernate, and that it is solitary in habit when hunting for its prey. Captain Hutton mentions that in Masuri it is found in caves and caverns, and even in crevices of rocks, and is occasionally attracted to the lamps in a room. This no doubt means that the light of lamps attracts insects, and in pursuit of these the bat enters rooms.

It will be seen that, in the foregoing list, 19 species of bats are admitted as occurring in Nepal. One of these (*Rhinolophus affinis*) is included with doubt, the specimen of that species presented by Mr. Hodgson to the British Museum having possibly been obtained in Darjiling, and not in Nepal. Of the total 19 species, 3, namely, *Pteropus medius*, *Cynonycteris amplexicaudata*, and *Cynopterus marginatus*, are certainly not part of the fauna of the Nepal Valley. They have been found there as mere stragglers from a neighbouring tract of the country which differs essentially, in point of elevation and of fauna and flora, from



our valley. These three bats extend all along the Himalayas, in the low and hot portions adjoining the plains; and they only penetrate into the hills for considerable distances, in suitable localities, up low-lying river valleys.

Of the 15 or 16 species of Chiroptera properly belonging to the Nepal Valley, only one (*Vespertilio nipalensis*) is, so far as known, peculiar to this small part of the Himalayas. Another species (*Rhinolophus macrotis*) is only known to occur in Nepal and at Masuri further west in the Himalayas. All the rest have a more or less wide range in the Himalayas, both east and west of Nepal.

A few words remain to be said about certain species which have been hitherto wrongly attributed to Nepal by various authors. The number amounts to six or seven, and these I will now briefly notice.

1. As already shown, *Cynopterus marginatus* has been included in the Nepal list by many writers owing to a misidentification of *Pteropus pyrivorus*, Hodgs.

2. *Megaderma lyra* is said to be represented by specimens in the British Museum from Nepal, in Dr. Dobson's 'Catalogue of Chiroptera' (p. 157). This is erroneous, as the specimens referred to were presented by Mr. Hodgson, and he first obtained the species in the Siligori Bungalow, Sikkim Tarai, in 1847, long after he had permanently left Nepal.

3. *Synotus darjilingensis* is given by Dr. Horsfield (P. Z. S. 1856, p. 395) as from Nepal, under the names of *Barbastellus communis* and *Plecotus darjilingensis*, Hodgs. This is clearly wrong, as the title given by Hodgson sufficiently shows.

4. *Plecotus auritus* is indicated by Dr. Dobson (Cat. Chir. Brit. Mus. p. 179) as from Nepal, on the evidence of the type specimen of *Plecotus homochrous*, Hodgson. That type, however, was obtained by Hodgson in Darjiling (Gray, Cat. Hodgson's Coll. 1863, p. 2), and he never got the species in Nepal.

5. Dr. Horsfield states (P. Z. S. 1856, p. 394) that *Murina suillus* (= *Harpiocephalus harpia*) was obtained by Hodgson in Nepal. This is not so: the species was called *Noctulinia lasyura* by Hodgson, and was obtained by him in Darjiling (Gray, Cat. Hodgson's Coll. 1863, p. 3).

6. *Vespertilio mystacinus* has been stated by more than one writer to have been procured by Hodgson in Nepal. This is a mistake: he first obtained the species in the Siligori Tarai, and named it *V. siligorensis*. *Vespertilio darjilingensis* is also attributed by Horsfield (loc. cit.) to Nepal; it is probably the same as *V. mystacinus*, and if Hodgson got it in Nepal he must have named it on the model of *lucis a non lucendo*.



